MATH 540 (Advanced Ordinary Differential Equations)
Spring 2006

Time: MWF at 11:30 am
Place: CW 023

Instructor: Maria Alfonseca
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Phone: 532-0575
Office Hours: By appointment

Text: *Differential Equations* (3th edition) by Edwards and Penney, Prentice Hall. ISBN 0-13-067337-4.

A copy of the 2nd edition of the textbook is on reserve at Hale Library.

Course objectives:
In this course we will study differential equations as mathematical models. We will learn how to find the exact solution of some particular equations. However, this is not always possible or practical. In these cases we will learn to extract information about the behavior of a solution from the differential equation itself. We will also study some simple techniques to find a numerical approximation to a solution.
We will cover the following topics:

1. First-Order differential equations:
   Separable equations, exact equations, linear equations
   Slope fields and solution curves
   Existence and uniqueness theorems
   Dependence of solutions on the inicial values and parameters
   Some mathematical models: Equilibrium solutions and stability
   Numerical approximation: Euler's method

2. Second order linear equations:
   Equations with constant coefficients, homogeneous and inhomogeneous equations, variation of parameters
   Boundary value problems
   Series solutions

3. Systems of Differential Equations:
   Review of linear algebra
   The eigenvalue method
   Matrix exponentials solutions
   Stability and phase portraits

4. Nonlinear Systems

Grading policy: Evaluation will be based on your performance on the homework problems, quizzes, midterm exams and final exam. Attendance and class participation will be considered in borderline cases.

Homework: You are expected to attempt all of the homework problems. You are encouraged to discuss the problems with your classmates; however, you must write your solutions independently. In your written solutions, consider including sentences in addition to equations; this will make your solution easier to understand.

If you do not completely solve a problem, you should write your best attempt, indicating where you got stuck. The reason to do this is twofold: first, you will get some partial credit for your work; second, I will be made aware of what you are finding difficult and will be able to better address it.

Please read carefully the notes I will write in your homework. I may ask you to make an appointment with me to go over some of the problems together. When this happens, you should make this appointment as soon as possible.

Late homework is discouraged, because it is important to stay current with the course. Only one late homework from each of you will be accepted, provided that you give a reasonable explanation for the delay.

Attendance and class participation: You are encouraged to be an active learner in this course. Part of being an active learner is coming to class and asking questions. If you need to miss a class, please let me know.

Midterm exams: There will be two in-class midterm exams, on Monday Feb 27 and on Monday Apr 17. Make-up exams will be given only if you document the reason why you missed the exam.

Final exam: Tuesday, May 9, 11:50 a.m. – 1:40 p.m.

Important notices:

1. While you are encouraged to work together on the homework, you must write up your solutions independently.

2. If you have any condition, such as a physical or learning disability, which will make it difficult for you to carry out the work as outlined above or which will require accademic accomodations, please notify me in the first two weeks of classes

3. Plagiarism and cheating are serious offenses and may be punished by failure on the exam, paper or project, failure in the course, and / or expulsion from the University.

Please complete the following survey:

Name:

Email:

Major:

Preferred day and time for office hours:

When did you take Math 240 (Elementary Differential Equations)? (Semester and Year)

Write any comments you have about your previous experience with Differential Equations (e.g., What did you like the most about Math 240? What did you not like?)